The Creative Learning Spiral: Designing Environments for Flaring and Focusing

Jane Zhang

Abstract With growing interest in creative learning in recent years, this paper sought to define creative learning through the design of learning spaces. Two learner groups were studied for their interactions with peers, educators, and their spaces—design students at Harvard’s Graduate School of Design, a traditional architectural studio environment, and student entrepreneurs at the Harvard Innovation Lab, a startup venture incubator. The result was a new design framework called the creative learning spiral, which groups creative learning into four types of activities: *sparkling*, *making*, *grazing*, *socializing*. The open layouts of both settings facilitated social learning activities of *sparkling*, *grazing*, and *socializing*, whereas *making* time required students to create their own focused environments. The creative learning spiral can be used as a tool to assess the spatial needs of specific creative learning activities, in order to design environments that accommodate the needs of learners.

Introduction

In the context of a rapidly evolving knowledge economy, creativity has become one of the most highly regarded qualities of a twenty-first-century graduate, across age levels. Tony Wagner defines creativity in terms of curiosity and imagination (Wagner & Compton, 2015). Jal Mehta and Sarah Fine, pioneers of the Deeper Learning movement, observe that “on the professional front,” students “need to be able to tackle open-ended problems in critical, creative, and collaborative ways” (Mehta & Fine, 2015).

Research on the theory and practice of creative learning has stemmed primarily from the fields of psychology and education. In the former, the field of creativity was long studied using the level approach, focusing on “understanding, predicting, and nurturing people’s ability to produce novel ideas, solutions and products that served some need” (Puccio & Chimento, 2001). In 1976, Kirton introduced a departure from this method, proposing “a cognitive style continuum that ranges from an adaptive to

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an innovative orientation [where] location along this continuum indicates the extent to which an individual will exhibit either a more adaptive or more innovative style of creativity” (Puccio & Chimento, 2001).

Within K-12 education research, the act of creation has been central to definitions of creative learning. Mehta and Fine (2015) see creativity as capturing “the shift from receiving the accumulated knowledge of a subject or domain to being able to *act* or *make* something within the field.” Mitchell Resnick of the Lifelong Kindergarten group at the MIT Media Lab sees creative learning as a culmination of four Ps: project, peers, passion, and play (Schmidt, Resnick, & Ito, 2016). Architect Saeed Arida founded NuVu Studio, an innovation school for middle and high school students, to concretize the need to develop both *seeing* and *doing* in students. According to Arida, the creative process combines mindfulness with doing and is fundamentally social (Arida, 2010).

This chapter aims to reframe these previous conceptions of creativity through a spatial design perspective. How might creative learning be understood through the learner’s use of space? Arguably, creative learning in the twenty-first century both requires and allows the physical learning environment to act as a teacher in facilitating learning. The creative learning spiral—a theoretical framework combining four modes of learning—is developed through the understanding of a learner’s postures in space, and how one engages with people and objects in the learning process.

Methodology

The creative learning spiral was developed out of studying two learner groups: designers at the Harvard Graduate School of Design (GSD), and entrepreneurs at the Harvard Innovation Lab (i-lab). Within the author’s campus environment at Harvard University, these sites were chosen for their relatively high concentrations of two types of creative work. The GSD exemplifies a traditional architectural studio environment, where students are tasked with projects to produce a variety of 2D and 3D models of space. The i-lab represents an increasingly popular typology on college campuses—the startup incubator, where students are provided a dedicated environment with resources to start and develop viable ventures.

The Harvard Graduate School of Design is one of the oldest design schools in the country. Architecture courses were first taught at Harvard University in 1874, and the GSD was officially established in 1936, combining three fields of architecture, urban planning, and landscape architecture. Today, its programmes also include urban design, design studies, real estate, and design engineering.

The primary pedagogy of the GSD is the architectural design studio—a project-based learning model and environment in which “designers express and explore ideas, generate and evaluate alternatives, and ultimately make decisions and take action” (Gross & Do, 1997). The GSD studio model is based off of mid-century Bauhaus workshop pedagogy, which builds upon “modern-era teaching methods [that] ranged from lecture courses to workshops where students would learn how to build from the

day they stepped into the workshop” (Lueth, 2008). The design studio focuses on hands-on, interactive, and integrative learning, all of which take place in the studio. Austerlitz, Aravot, and Ben-Ze’ev (2002) outlined four characteristics of the modern-day design studio, one of which was the personalized design process, which implies creativity, and the space for a student to lay out his or her ideas in the open.

Gund Hall, which opened its doors in 1972, was designed by Australian architect and GSD graduate John Andrews. Its primary feature is the collective studio space that extends five levels under a stepped, clear-span roof with natural lighting and views towards Boston. The central studio space is enveloped with a band of classrooms and offices on every floor. The main floor is home to a rotating public exhibition space, the Loeb library, and Piper Auditorium. The basement holds the stacks of Loeb library and the fabrication labs.

This portion of the study employed the ethnographic method of participatory observation of the studio learning over the course of one academic year. The author attended GSD classes and seminars, interacting daily with peer design students in the studio space (Fig. 1).

The second portion of the study explored student use of the Harvard Innovation Lab, an incubator for student-led startup companies, across Harvard’s College and graduate schools. The i-lab occupies most of the ground floor of Batten Hall on the campus of Harvard Business School (HBS). Before it opened its doors as part of HBS in 2011, the building was previously home to WGBH’s TV and radio studios. The i-lab serves as a resource to foster collaboration and incubate ideas among Harvard

Fig. 1 Gund Hall section drawing showing the open air, tiered studio space

Fig. 2 Axonometric 3D model of the first floor of Batten Hall, showing the Harvard Innovation Lab space. *Source* Shepley Bulfinch (with permissions from Shepley Bulfinch)

students, faculty entrepreneurs, and members of the greater Boston communities through regular programming.

A random sampling of 21 students (out of 66 teams) was surveyed for their use of the space in relation to creativity, focus, and general productivity. Students elected to participate in the study by responding to a survey link sent through an internal Facebook group, and students completed it anonymously over the span of one week. A survey was used to scale up the observational methods used at the GSD, in order to capture a larger breadth of responses (Fig. 2).

Survey questions were designed to elicit user feedback about productivity, creativity, and general use of the incubator workspace. The following consist of a combination of quantitative and qualitative questions:

- What do you like most about the space at i-lab?
- What % of the time do you feel creative here? (e.g. generating wild ideas)
- Where does that happen and what are you doing?
- What % of the time are you able to focus here?
- Where does that happen and what are you doing?
- Where in the i-lab do you feel most productive? Why?
- When do you feel most productive here? What are you doing in these moments?
- Where outside of the i-lab do you like to work? What do you like about it there?
- If you could change one or two things about the i-lab space, what would it be?

A combination of open-ended and closed-ended questions was used to achieve depth and breadth in student responses. Students were asked to identify the percentage of the time they felt creative and focused on the space, and where and when they felt most productive in the space. These responses provided a quantitative baseline to form a community profile, and were coupled with more open-ended questions for students to discuss their specific pain points, preferences, and suggestions for the space. Textual analysis was run on the open-ended answers to determine the most popular keywords and sentiments for each question, from which specific responses were examined to build user profiles.

Findings

Graduate School of Design: The GSD study resulted in four steps of the studio learning process, each tied to a specific space typology.

Lecture Hall

The creative process for each studio course begins with *sparkling*, or inspiration, from an expert figure. This mainly takes the form of lectures and guest talks, where a design luminary provides both context for a project and design direction (Fig. 3).

Fig. 3 Illustration showing the process of sparking, or inspiration, in a lecture-based setting

Site Visits

Once students are sparked with theory and background information, they conduct site visits to better understand the context in person. These visits are guided and framed by design professionals in the field, often policymakers or clients who provide the design brief and project constraints. This phase represents intensive information-gathering—taking lots of notes and pictures—that students will later sift through back in studio.

Studio

The studio area takes up the majority of the square footage in Gund Hall, aptly corresponding to the amount of time students spend in this space. Design students are notorious for living “in-studio,” spending up to 80 hours a week at their desks, working on drawings, models, and socializing with studio-mates. Many students spend their entire days and evenings here, leaving only for classes and sleep, especially during final review season (Fig. 4).

Each student enrolled in a studio course receives a semi-private desk area, with a 30” × 70” table space. The open-air studio is combined with frosted plexiglass

Fig. 4 Gund Hall studio space at peak occupation. *Source* Hayoung Hwang, The Harvard Crimson (with permissions from The Harvard Crimson)

Fig. 5 Illustrations showing the phases of making and socializing, where students engage with their work individually and with peers

dividers between studio desks, making for semi-private workspaces. Depending on where one sits in this five-floor studio, one may hear the din of conversation in the cafeteria downstairs, printers and plotters whirring at the ends of each floor, and people walking through on their way to classes. To indicate focus, students plug in headphones and listen to music, podcasts, or watch TV as they work.

Throughout the semester, students have multiple opportunities to showcase their work and receive feedback: peer feedback between students in studio; desk crits, i.e. one-on-one meetings with faculty at student desks; pin-up sessions where students pin up their work for faculty to critique (Fig. 5).

Studio Review

The studio process culminates in a final review, where each student is allotted time to present his or her work to an esteemed panel, and receives feedback. At the end of each semester, Gund Hall transforms from museum to theatre mode as final review season dawns. Virtually all desk, floor, and classroom space becomes occupied by all kinds of materials and forms. The final review, or critique, is the telos of the design studio—where all efforts culminate in a single performance. The student carefully prepares drawings on boards, models on pedestals, and presents the project to a panel of design luminaries and studio-mates. The space is set up with the presenter's work as the focal point and the presenter defending the particular design proposal; surrounded by a panel of experts who ask pointed questions and examine the models

Fig. 6 A diagram depicting the spatial hierarchy of participants in a final review setting

and drawings at their leisure; and an outer halo of interested observers, mainly other students (Fig. 6).

Harvard Innovation Lab

The findings from the second portion of the study revealed insights about the effectiveness of an open layout for productivity, in terms of both creativity (generating original ideas) and focus (heads-down work time) (Fig. 7).

Based on textual analysis, the most frequent responses to the question “What do you like most about the space at the i-lab?” were the variety of *seating* options, conference *rooms*, access to *people*, *open* layout for ease of communication, and *flexibility* of furniture. Users felt creative in the space 38% of the time, and typically that would occur during brainstorming sessions or team meetings, where ideas were being exchanged, particularly through the use of a whiteboard. Overall, users were able to focus 68% of the time. The biggest keyword around productivity was *headphones*, followed by working on a *computer*, *plugged* in, and sitting at a *desk*. Drilling down further, users felt most productive in meeting *rooms*, followed by *open* workspaces.

For those that spent all day in the incubator, early mornings and evenings tended to be the best times for productivity, as these times were quiet, with the least distractions. Mid-day brought peak noise hours, and almost all respondents dealt with noise by plugging in headphones or working in private meeting rooms.

When asked what they would change about the space, top suggestions were “desks,” “warmer,” and “space,” suggesting ergonomic improvements, temperature comfort, and optimizing space use with the overall layout.

A few users were extremely satisfied with the space, reporting high rates of creativity and focus. One user, who experienced 90% creativity and 95% focus (90/95), liked many attributes of the space: “the lighting, the different opportunities to interact with the great people there (food space/events, table tennis area), the possibility to use silence private rooms when needed, the business talks.” They found

Fig. 7 Plan view of the i-lab incubator space. *Source* Shepley Bulfinch (with permissions from Shepley Bulfinch)

no particular productivity patterns, and felt productive in both the open and private spaces. One user would only go into the i-lab to work, which usually looked like brainstorming in a room, and thus reported 100% creativity and productivity in the space.

The majority of users (86%) felt productive more of the time than creative. One user cited 10% creativity and 90% productivity, primarily because of the stage they were at with their company: “I’m pretty far along with ideation of my company, so everything now is execution. Early on I had far more wild ideas during conversation with others.”

Only three users felt creative more of the time than productive in the space. One user, a 60/30, felt creative “in the [open] area with rolling whiteboards, in rooms with whiteboard walls, [and while] synergizing with other teams.” They found the most productivity while in a lounge chair with headphones in.

A few users did not find the space particularly creative or productive. One user (20/40) saw the i-lab mainly as “a place to go to work every day and feel accountable to myself.” This user felt creative at random times, “while [they were] sitting around and talking to people” and felt productive when “sitting far away from people with my headphones in.”

Among other insights, the data indicates that the i-lab's open layout works well for spontaneous meetings, socializing, and peer feedback. However, for the majority of *making*, or heads-down work time needed for entrepreneurial projects, the open layout—and the distractions it produced—sometimes posed a hindrance to productivity.

Results

According to Amy Webb (2017), conflicts often arise in teams or organizations due to the “duality dilemma”—the clash between people whose dominant characteristic is either creativity or logic. Webb says this is responsible for a lack of forward thinking at many organizations. An effective way that she proposes to overcome this duality is to “harness both strengths in equal measure by alternately broadening (“flaring”) and narrowing (“focusing”) its thinking” (Webb, 2017). The idea is to facilitate a co-working process whereby both generative, creative thinking as well as analytical, logical thinking are rewarded. With creative learning, a similar sequence of generative and logical modalities is needed.

One key pattern arising from the space use logic at both the GSD and the i-lab is the presence of both flaring and focusing as key activities of creative learning. Among these activities, the learner either focuses or flares on people or objects. As such, the following creative learning spiral was observed:

The spiral begins with *sparkling*, or focusing on one person. These bouts of inspiration come from the setting of a lecture, talk, or a private meeting with some expert or mentor figure. Next, in the *making* phase, the learner focuses on objects with heads-down tinkering and work time. Third, the learner enters a research phase of *grazing* on different materials and objects, from precedent projects to research papers to field visits. Fourth, the learner socializes with his or her peers, giving and receiving feedback to discuss ideas and refine their projects. The spiral closes with a phase of *reverse sparkling*, where the learner demonstrates his or her learning through performing or showcasing the project. At this phase, the learner receives critical feedback from mentors and experts, and the aim is for this feedback to funnel into future work. This process is not linear—learners can go back and forth between phases during the creative learning process. Moreover, creative learning is iterative—hence a continuous spiral (Fig. 8).

This spiral is designed to act as a framework for both designing and assessing learning environments for creative work. For educators and institutions looking to move towards student-driven, hands-on project-based learning, these four learning modalities and postures can serve as a launch pad for learning space and curriculum design.

Key questions in designing a learning environment include:

- What does this type of learning look like (i.e. human postures and activities)?

Fig. 8 The creative learning spiral, depicting four modes of learning: sparking, making, grazing, and socializing

- How might we effectively provide learners with access to the people, materials, and resources needed for this specific project?
- What pedagogical tools (including spaces) need to be considered?
- What measures of learning do you hope to enhance in this learning environment?

Discussion

Much of the existing literature on creative learning focuses on the learner's personality, or interactions with educational material and other people. Often, the environment in which this learning takes place is overlooked, yet it can have a significant impact on the learning experience. This chapter explored the potential for a creative learning framework defined through the space. Through participatory observation, quantitative and textual analysis of user feedback, this study produced four related outcomes.

First, the creative learning activities observed at the GSD and the i-lab both support a strong connection between space types and the learning modalities. As the images below illustrate, each space type accommodates one or several learning modalities in the creative learning spiral. Lectures at the GSD and office hours with mentors at the i-lab accommodate *sparking*, where students engage with new ideas from experienced advisors. The open studio or workplace facilitates both *making* and *socializing*—students work heads-down work and tinkering, while having easy access to peers for collaboration and feedback. Site visits, and sometimes the work environment itself, provide fodder for *grazing*, researching, and engaging with project precedents. In many instances, *grazing* may involve more digital than physical artefacts, such as in

the case of having many tabs open on one’s web browser (Figs. 9, 10, 11, 12, and 13).

Secondly, while the four modalities and their accompanying spaces may all be integral to the creative learning process, the i-lab study in particular showed that not all these activities merit equal time or attention. The i-lab users cited feeling creative 38% of the time and focused 68% of the time, yet the majority of critiques reflected

Fig. 9 The sparking stage involves bouts of inspiration from experienced advisors, which can take place in settings such as lecture halls and office hours

Fig. 10 The making stage consists of heads-down individual work and tinkering time, shown here in a collective studio and open workspace

Fig. 11 The grazing process involves researching and engaging with a project's precedents. This can include library research, field research, or desk research in-studio

Fig. 12 Socializing one's work involves giving and receiving feedback from peers. Ideal environments include in a collective studio, breakout rooms, or semi-private spaces

a need for *more* focus time. In fact, the square footage of the i-lab is roughly 25% closed rooms and 75% open layout (Fig. 6). As such, the space privileges more social learning activities—*sparking*, *socializing*, and *grazing*. The space was successful at facilitating social connections, though acoustic openness may not have served student needs in *making*.

Fig. 13 The creative learning spiral redrawn to reflect heads-down making time making up the majority of the learning process

In the case of both the i-lab and GSD, one might redraw the creative learning spiral into the following pie chart diagram, depicting time spent on various activities. Heads-down *making* may consist of about 80% of the creative learning process, whereas the other activities make up just 20% of the time.

This 80/20 ratio is simply an estimate by the author based on the aforementioned observations, surveys, and interviews. The numbers could be validated in accuracy and precision by ensuring that the observational and survey methods were employed equally in both sides. In addition, sensors could be used to measure occupancy and flow in the spaces, expand data collection capabilities to real-time, 24/7 inputs. These inputs could complement the participatory observation, which surfaces qualitative details from users.

Thirdly, while learning environments are shown to facilitate or hinder certain activities, space constraints are not decisive of learning or productivity. Both Gund Hall and the i-lab were designed with *sparking*, *socializing*, and *grazing* activities in mind, with ample space for interaction and connection among students, and between students and mentors. However, in both environments, students ended up spending the majority of the time in *making* mode, which based on survey responses, requires some acoustic privacy and/or distance from distractions.

In both the GSD and i-lab open-air environments, students compensated for acoustic distractions by plugging in headphones. From a design research perspective, headphones can be read as a coping mechanism, or adaptation to one's environment to achieve productivity. In other words, there is a need in these environments for semi-private workspaces, particularly for acoustics. The designer of a creative learning space such as an open studio or open workspace, then, is encouraged to generate design solutions that not only allow for social learning activities, but also serve the large need for heads-down focus time. Such solutions might look like semi-private booths, pods, acoustic panelling, partial barriers, among other things. Ultimately, the

goal would be to achieve the right balance of focus and creativity needed for creative learning.

Fourth and lastly, design of a particular learning environment ought to account for the needs of its particular user population, and more importantly the curriculum or pedagogy the environment is designed to facilitate. When designing or renovating a learning environment for creative activities, one might employ the creative learning spiral as a framework to plan and lay out the space. In addition to basic architectural questions such as safety, daylighting, flow, etc., spatial design questions related to the learning process include:

- What activities will learners and educators engage in? How do they fit into the categories sparking, making, grazing, and socializing?
- How much time will learners spend in each activity type?
- Which activities and programme elements require special spaces and/or equipment?
- What is the noise level of each activity type?

Answering these questions may provide a useful framework for the ratios among different space types, adjacencies, and acoustics. While the particular application will look different based on context, the creative learning spiral may be a valuable tool to connect the dots between pedagogy and space, leading to user-friendly environments for creative learning activities.

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